Trend Study 23R-3-03

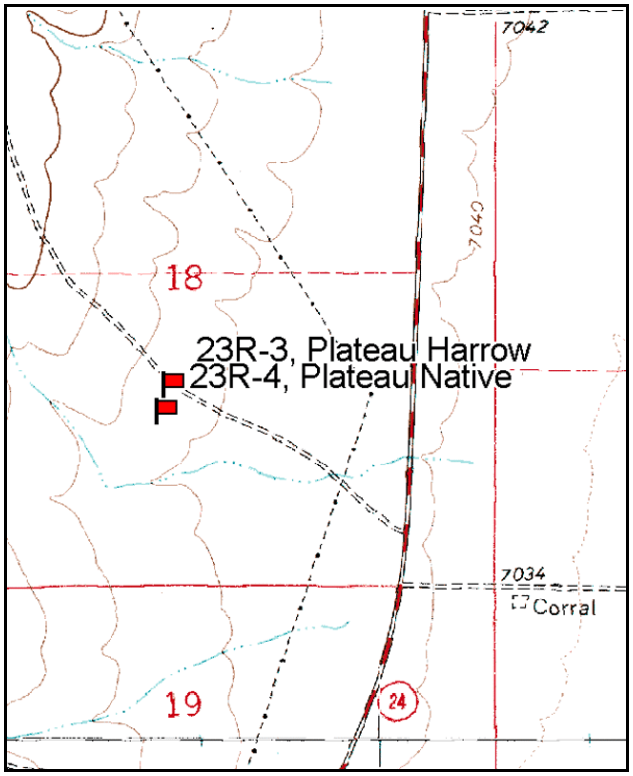
Study site name: Plateau Harrow . Vegetation type: Perennial Grass .

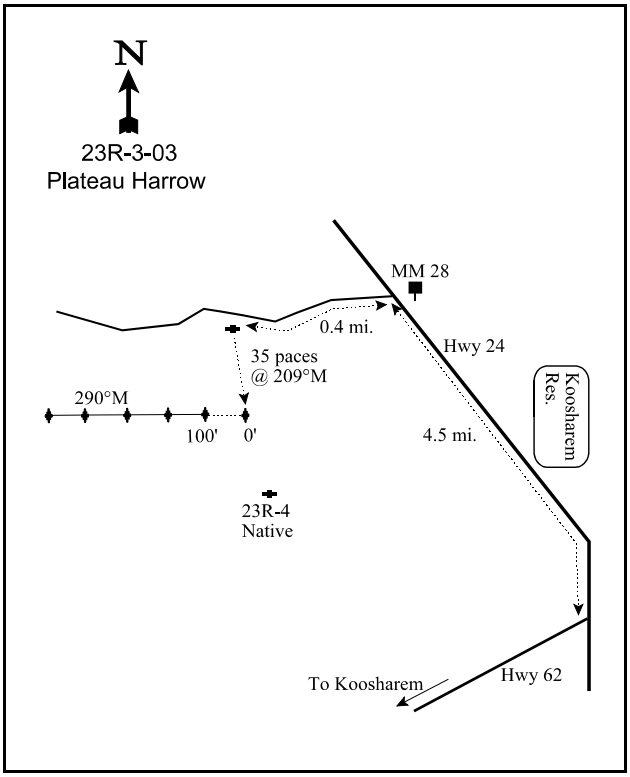
Compass bearing: frequency baseline 290 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

Start at highway 62 and highway 24 in Koosharem. Drive north on Hwy 24 for 4.5 miles to mile marker 28. Near mile marker 28, turn on to a road going west. Travel 0.4 mile to the witness on the left side of the road. From the witness post, walk 35 paces at 209 degrees magnetic to the 0' stake.





Map name: Boobe Hole Reservoir

Diagrammatic Sketch

Township 25S , Range 1E , Section 18

GPS: NAD 27, UTM 12S 4276136 N, 426936 E

DISCUSSION

Plateau Harrow - Trend Study No. 23R-3

This trend study was established in 1999 to monitor a 2-way harrow treatment of Wyoming big sagebrush on private land. This site is paired with an untreated site nearby and sampled with trend study 23R-4. These sites are located about 5 miles north of Koosharem Reservoir and about ½ of a mile west of Highway 62. Elevation is 7,100 feet with an eastern aspect. The area is high elevation winter and spring/summer range for deer and elk. It also grazed by sheep by the land owner but the area has been rested since the treatment was completed. Local biologists stated that deer have been regularly hit by cars during past winters and that deer and elk had been seen on the site during the winter of 1998. Pellet group data taken in 1997 and 2003 indicated light use by both deer and elk (<5 days use/acre).

Soil at the site is deep for a Wyoming big sagebrush site. Effective rooting depth was estimated at nearly 14 inches. It has a sandy loam texture which is neutral in reactivity. There was little noted horizon development in the soil profile and organic matter is low at 1.5% during the initial reading in 1999. Phosphorus was marginal at 10.8 ppm. Protective ground cover is abundant and there are few signs of erosion.

Prior to the harrow treatment, this site was dominated by a thick stand of Wyoming big sagebrush. The 2-way harrow treatment was intended to get around an 80% kill of sagebrush. Density of the sagebrush on the untreated sagebrush site was estimated at 2,000 plants/acre in 2003, while density was estimated at 700 plants/acre on the treatment area. This represents a 65% kill. Remaining sagebrush in the treatment area displayed light use in 1999. Vigor was good on most plants and there were few decadent plants (7%). In 2003, density declined to 700 plants/acre. Use remained light, vigor good, and percent decadence low at 17%. Seed production was excellent in 2003 and annual leader growth averaged nearly 2 inches.

The herbaceous understory is abundant and diverse. The grass composition is dominated by needle-and-thread grass which accounted for 42% of the total grass cover in 1999 and annual cheatgrass which provided 51%. Other perennial grasses included bluebunch wheatgrass, Indian ricegrass, bottlebrush squirreltail and Letterman needlegrass. Data from 2003 indicate a significant increase in the nested frequency of needle-and-thread while cheatgrass declined significantly. Needle-and-thread now provides 83% of the grass cover with a cover value of 19% (‘03). Cheatgrass declined to 1% cover which now represents 6% of the grass cover (‘03).

The forb composition is also abundant and diverse. Seeded forbs, Lewis flax, yellow sweet clover, alfalfa, and small burnet, all established in small numbers in 1999. The most abundant perennial forbs include stoneseed, Utah deervetch, and lupine which provided 83% of the total forb cover in 1999 and 97% in 2003. During the 2003 reading, no seeded forbs were encountered.

1999 APPARENT TREND ASSESSMENT

Soil conditions are good with abundant protective ground cover to prevent erosion. The treatment reduced the sagebrush from just under 2,000 plants/acre in the adjacent untreated native site to 840 plants/acre in the harrowed area. This represents a 56% kill. Average cover declined from 17% on the native site to 4% in the harrowed area. The remaining sagebrush are lightly browsed and in good vigor. They should slowly increase in density. The herbaceous understory is abundant and diverse with grasses providing about 60% of the total herbaceous cover. Needle-and-thread is the most abundant perennial grass and it accounts for 42% of the total grass cover. Unfortunately, annual cheatgrass is also abundant and it provides just over half (51%) of the total grass cover. Hopefully, perennials will increase in abundance and out-compete cheatgrass. Forbs are also abundant and diverse with seeded forbs, Lewis flax, yellow sweet clover, alfalfa, and small burnet, establishing in small numbers. The most abundant perennial forbs include stoneseed, Utah deervetch, and lupine which provide 83% of the total forb cover.

2003 TREND ASSESSMENT

Trend for soil is up since 1999. Vegetation cover has remained constant but litter cover has increased from 29% to 41%, while cover of bare ground has declined from 22% to 10%. There is abundant protective ground cover coming mostly from perennial grasses. The browse trend is stable. Density has declined slightly but use remains light, vigor good and percent decadence low at 17%. Some seedlings and young were counted indicating successful recruitment since the treatment. The only other shrubs on the site include a few prickly phlox and prickly pear cactus. Trend for the herbaceous understory is mixed. Trend is up for grasses with a significant increase in the nested frequency of needle-and-thread grass combined with a significant decline in annual cheatgrass. Needle-and-thread rose in average cover from 7% in 1999 to 19% in 2003. It now provides 83% of the total grass cover and 62% of the total herbaceous cover. Cheatgrass declined from a cover value of 9% in 1999 to only 1% in 2003. Other perennial grasses, bluebunch wheatgrass, Indian ricegrass, bottlebrush squirreltail, and Letterman needlegrass occur in small numbers. Trend for perennial forbs is down with an overall decline in sum of nested frequency. In addition, all seeded forbs encountered in 1999 were not found in 2003. Stoneseed and lupine dominate the forb composition by providing 97% of the total forb cover. The herbaceous trend is considered up slightly due to the improvement in perennial grasses and the decline of cheatgrass.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --
Management unit 23R, Study no: 3

Type	Species	Nested Frequency '99	Nested Frequency '03	Average Cover % '99	Average Cover % '03
G	Agropyron spicatum	$_{b}$35	$_{a}$11	.87	.48
G	Bromus tectorum (a)	$_{b}$389	$_{a}$126	8.64	1.36
G	Oryzopsis hymenoides	$_{a}$6	$_{b}$13	.24	1.14
G	Sitanion hystrix	$_{a}$8	$_{b}$26	.04	.47
G	Stipa comata	$_{a}$165	$_{b}$276	7.05	19.36
G	Stipa lettermani	$_{a}$-	$_{b}$22	-	.44
Total for Annual Grasses		389	126	8.64	1.36
Total for Perennial Grasses		214	348	8.21	21.90
Total for Grasses		603	474	16.85	23.26
F	Alyssum alyssoides (a)	$_{b}$237	$_{a}$-	1.51	-
F	Astragalus convallarius	6	3	.04	.09
F	Cryptantha spp.	5	-	.18	.00
F	Eriogonum racemosum	14	12	.17	.11
F	Eriogonum umbellatum	3	-	.00	-
F	Ipomopsis aggregata	1	-	.00	-

Type	Species	Nested Frequency '99	Nested Frequency '03	Average Cover % '99	Average Cover % '03
F	Linum lewisii	3	-	.00	-
F	Lithospermum ruderale	43	41	3.42	4.54
F	Lotus utahensis	$_{b}$61	$_{a}$5	1.25	.24
F	Lupinus argenteus	$_{b}$23	$_{a}$15	4.44	3.11
F	Melilotus officinalis	1	-	.00	-
F	Medicago sativa	$_{b}$7	$_{a}$-	.02	-
F	Onobrychis viciaefolia	11	-	.04	-
F	Phlox longifolia	-	3	-	.00
F	Sanguisorba minor	9	-	.09	-
F	Sphaeralcea grossulariaefolia	1	-	.00	-
F	Streptanthus cordatus	-	2	-	.00
F	Tragopogon dubius	3	-	.00	-
Total for Annual Forbs		237	0	1.51	0
Total for Perennial Forbs		191	81	9.72	8.12
Total for Forbs		428	81	11.23	8.12

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 23R, Study no: 3

Type	Species	Strip Frequency '99	Strip Frequency '03	Average Cover % '99	Average Cover % '03
B	Artemisia tridentata wyomingensis	28	27	3.71	4.59
B	Leptodactylon pungens	0	1	-	-
B	Opuntia spp.	3	4	-	.03
Total for Browse		31	32	3.71	4.63

CANOPY COVER, LINE INTERCEPT --
Management unit 23R, Study no: 3

Species	Percent Cover '03
Artemisia tridentata wyomingensis	4.96
Opuntia spp.	.06

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 23R, Study no: 3

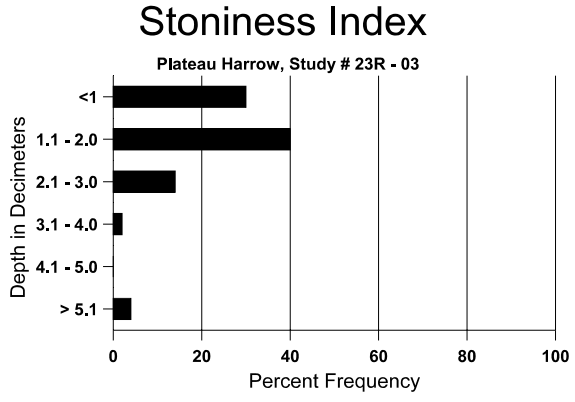
Species	Average leader growth (in) '03
Artemisia tridentata wyomingensis	1.7

BASIC COVER --
Management unit 23R, Study no: 3

Cover Type	Average Cover % '99	'03
Vegetation	35.65	35.26
Rock	.58	1.15
Pavement	15.69	20.71
Litter	29.06	41.16
Cryptogams	.01	0
Bare Ground	22.47	10.45

SOIL ANALYSIS DATA --
Management unit 23R, Study no: 3, Study Name: Plateau Harrow

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
13.5	68.0 (10.9)	7.1	63.6	19.8	16.6	1.6	10.9	198.4	0.5



PELLET GROUP DATA --
Management unit 23R, Study no: 3

Type	Quadrat Frequency	
	'99	'03
Deer	-	-
Rabbit	12	84
Elk	1	1

Days use per acre (ha)	
'99	'03
2 (5)	4 (10)
-	-
3 (7)	3 (7)

BROWSE CHARACTERISTICS --
Management unit 23R, Study no: 3

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Amelanchier utahensis											
99	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	9/12
Artemisia tridentata wyomingensis											
99	**840**	-	40	740	60	460	7	0	7	5	21/33
03	**700**	20	60	520	120	20	6	0	17	9	21/29
Leptodactylon pungens											
99	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**20**	-	-	20	-	-	0	0	-	0	5/9
Opuntia spp.											
99	**80**	-	40	20	20	-	0	0	25	25	4/13
03	**100**	-	-	100	-	-	0	0	0	0	5/12
Symphoricarpos oreophilus											
99	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	17/24